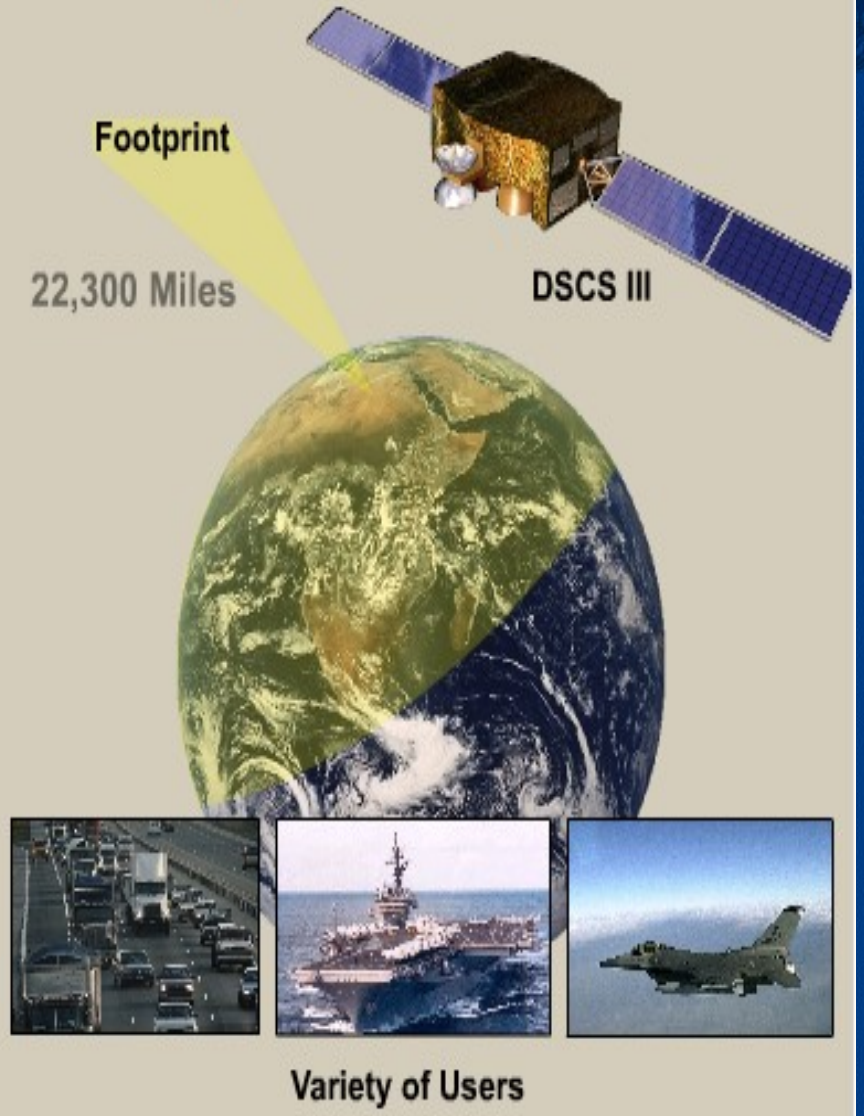
25U10/I01LP1
INTRODUCTION TO TACTICAL SATELLITE COMMUNICATIONS

People interact daily, using conversations, pictures, symbols, numbers, and signals to communicate. As technology has advanced, other communication tools such as, televisions, telephones, cell phones, pagers, computers, and fax machines have all been developed to help us communicate. Satellites make possible the transmission of images, messages, and data over g

Satellite Capabilities and Usage

Satellite Capabilities and Usage:

- Become geostationary at 22,300 miles
- Covers 42 percent of the Earth's surface
- Percentage covered known as the "Footprint"
- Transmission capacity serves a wide variety of users

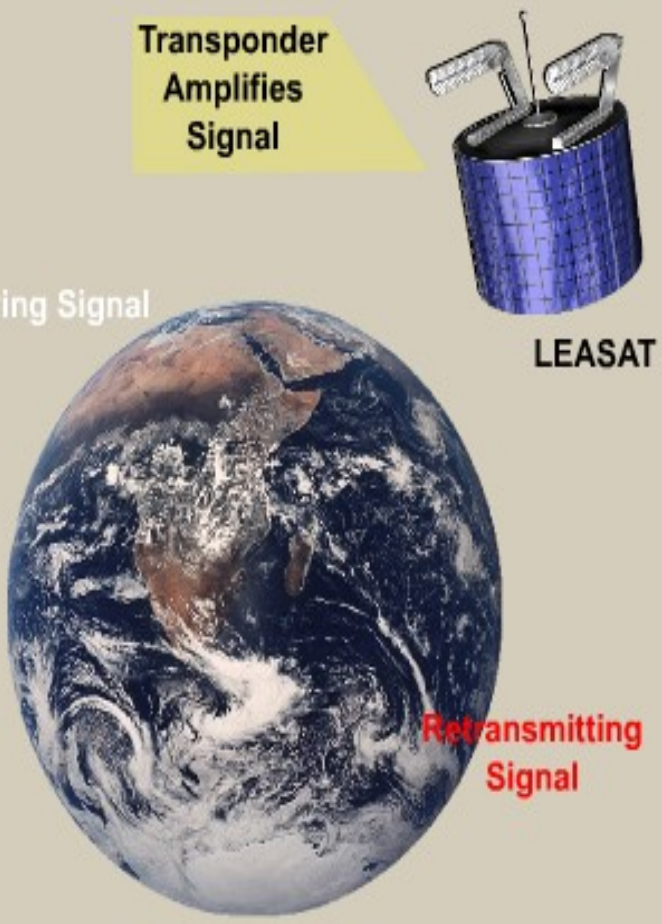


Satellite Functions

Satellites function using an active component known as a Transponder located INSIDE the satellite.

Transponders:

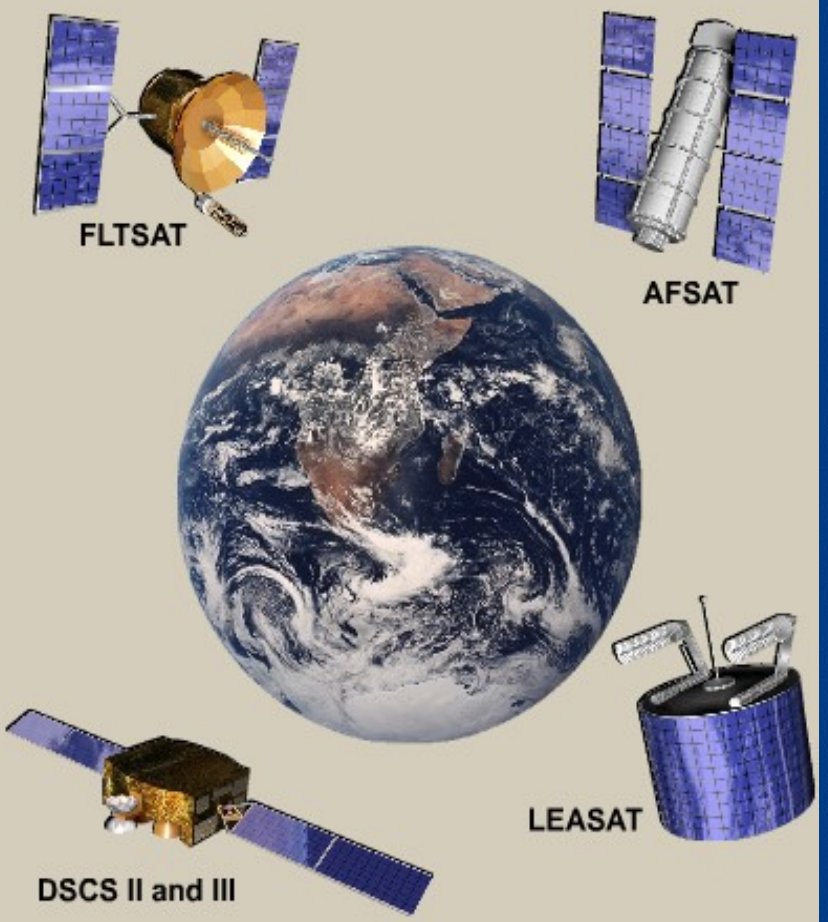
- Receive incoming signals
- Change carrier frequencies
- Amplify signals to overcome path loss



Types of Satellite Systems

Satellite systems used by the Military:

- Defense Satellite Communications Systems (DSCS II and III)
- Fleet Satellite (FLTSAT)
- Air Force Satellite (AFSAT)
- Leased Satellite (LEASAT)



Multi-Channel Satellites

The DSCS II and III Systems:

- Multi-Channel Communications Terminals
- Supports Secure Voice and Data Transfers
- Two DSCS II Satellites Currently in Orbit
- Nine DSCS III Satellites Currently in Orbit

Single-Channel Satellites

Owned and operated by the Navy (FLTSAT) and Air Force (AFSAT), these single-channel satellites share usage with the Army Single-channel earth terminals.

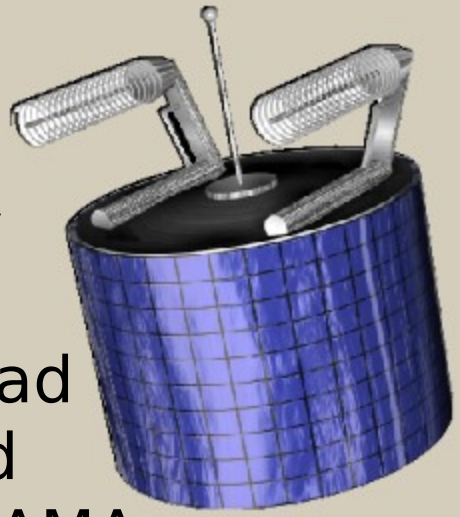
Worldwide communications between:

- Naval Aircraft
- Ships
- Submarines
- Army Ground Stations

AFSAT

FLTSAT

LEASAT, another single-channel system, is leased to the government by a private corporation. This system provides UHF communications to military air, sea, and ground forces. It’s necessary to submit a Satellite Access Request form or SAR, 14 to 30 days prior to your mission start date. Urgent requirements can be coordinated 24 hours in advance with a follow-up message. LEASAT uses four different satellite access techniques to allow communications. These are: Frequency Division Multiple Access or FDMA, Time Division Multiple Access or TDMA, Spread Spectrum Multiple Access or SSMA, and Demand Assigned Multiple Access or DAMA


LEASAT

Check on Learning

What are the two types of satellites?

Multichannel and Single-Channel.

Check on Learning

How much of the earth's surface will one satellite co

a. 12%

b. 33%

c. 42%

d. 50%

How much time in advance should the Satellite Access Request Form be submitted to AFSATCOM for a normal mission?

a. 1 to 7 days

b. 14 to 30 days

c. 14 hours, with a message follow-up

d. 24 hours, with a message follow-up

FLTSAT

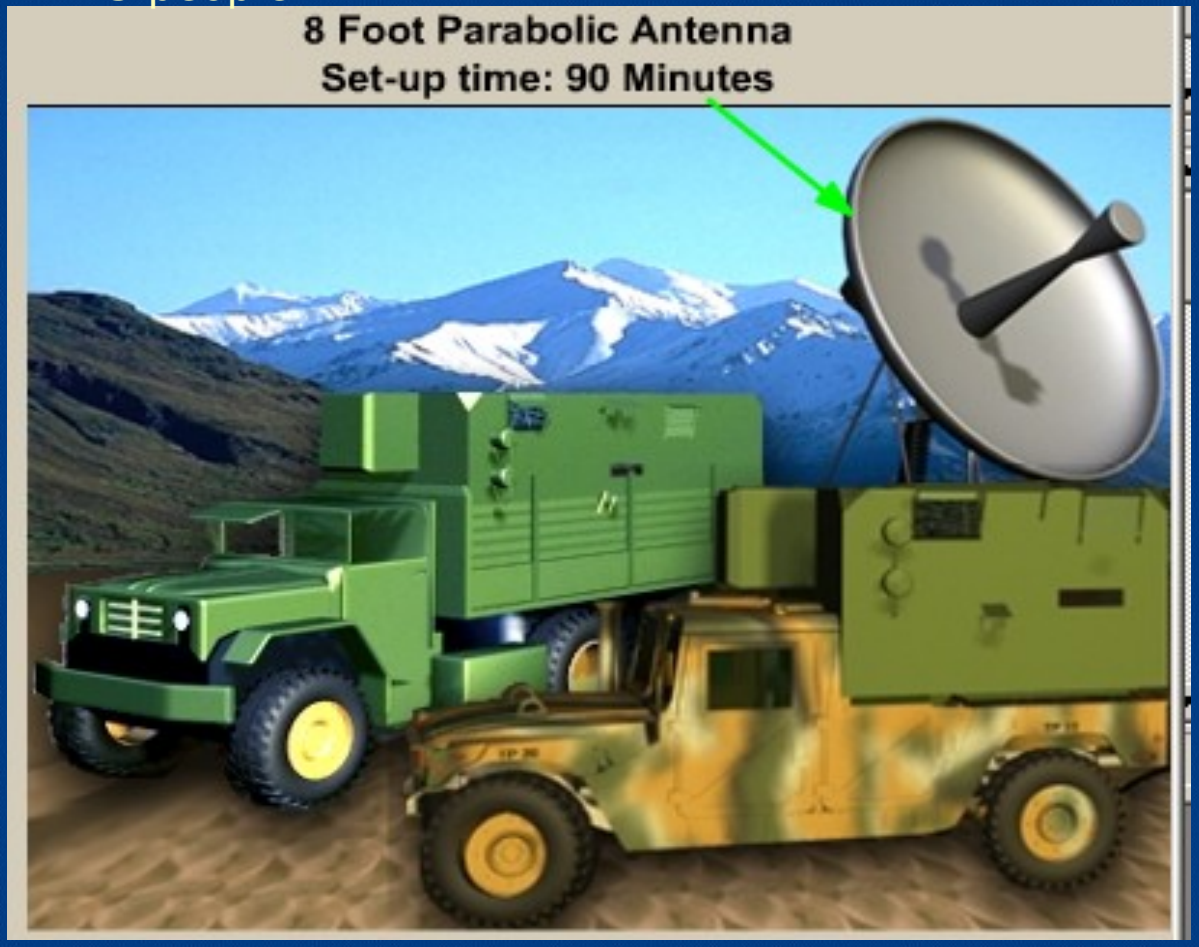
AN/PSC-5

Single Channel Satellites and Terminals

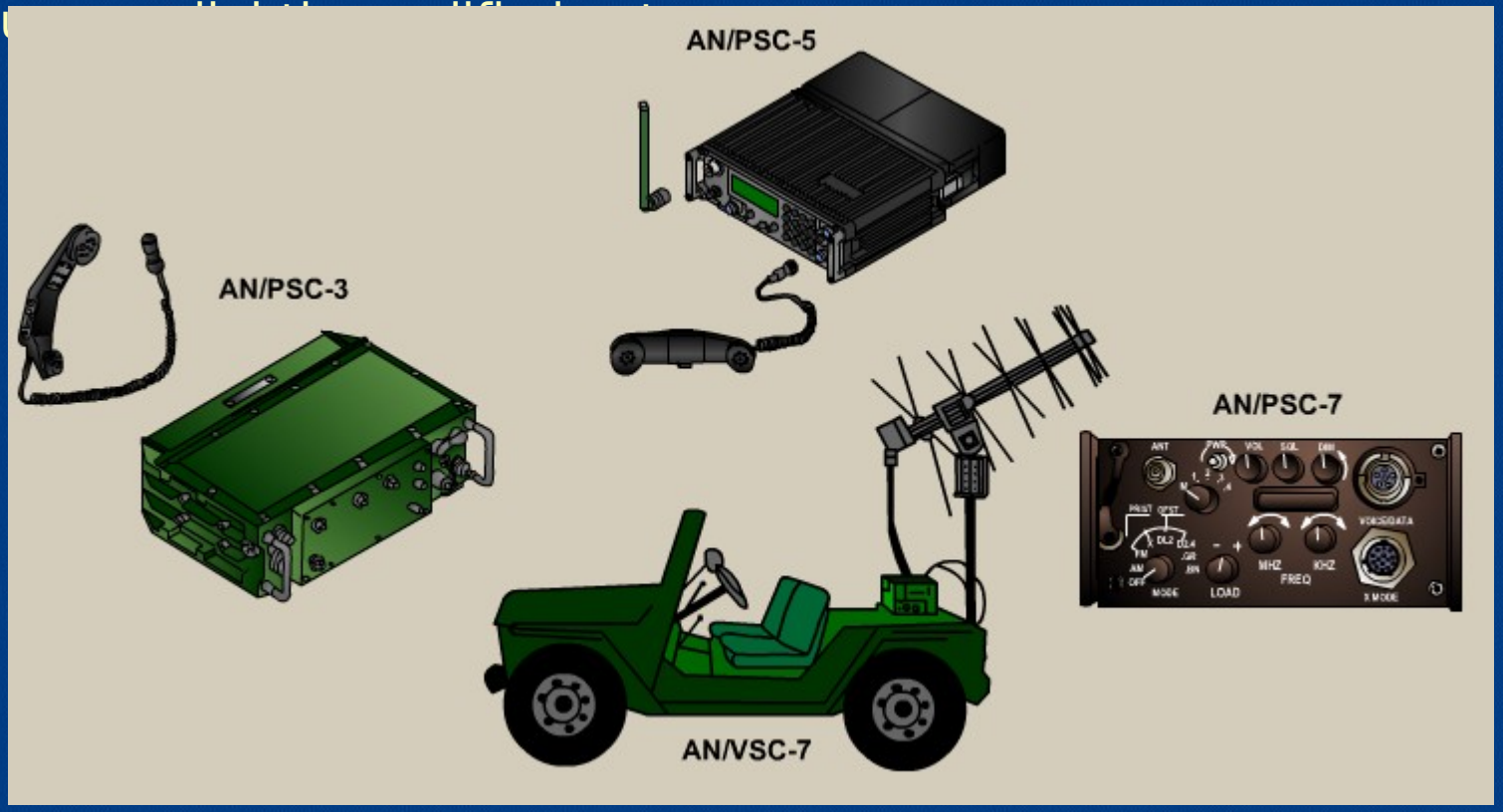
Frequency	Acronym	Meaning
3-30 kHz	VLF	Very-Low Frequency
30-300 kHz	LF	Low Frequency
0.3-3 MHz	MF	Medium Frequency
3-30 MHz	HF	High Frequency
30-300 MHz	VHF	Very-High Frequency
0.3-3 GHz	UHF	Ultra-High Frequency
3-30 GHz	SHF	Super-High Frequency
30-300 GHz	EHF	Extremely-High Frequency

Satellites and their communications terminals use radio frequencies to transmit information. These frequencies range from very low to extremely high. The frequencies are divided into kilohertz, megahertz, and gigahertz. Multi-Channel satellites and terminals transmit on SHF or Super-High Frequencies. Single-Channel satellites and terminals transmit on UHF or Ultra-High Frequencies.

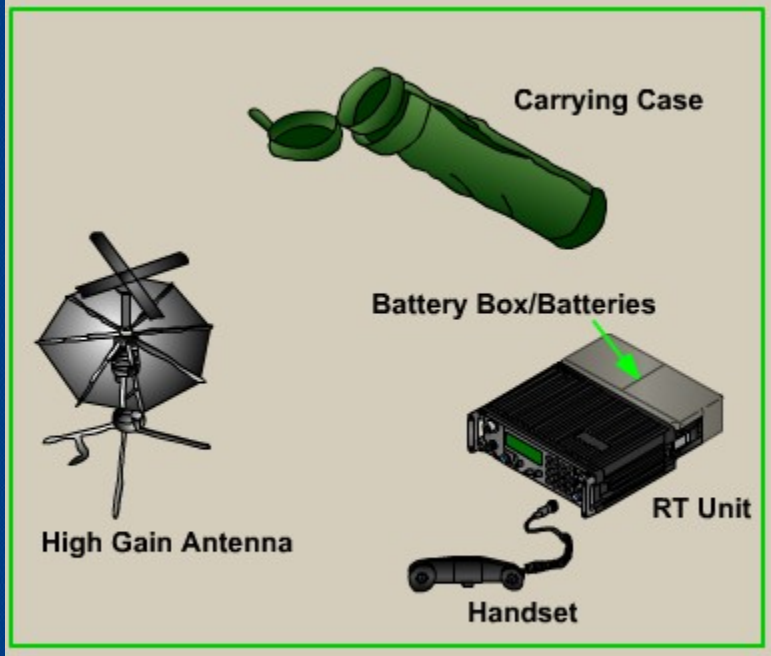
Communications with Multi-Channel Satellites require the use of Multi-Channel Earth Terminals such as the AN/TSC-85 and AN/TSC-93. These multi-channel radios provide voice/data communications and are housed within shelters. Both terminals require one 8 Foot parabolic antenna. Complete set-up time for these terminals is 90 minutes with 3 people.



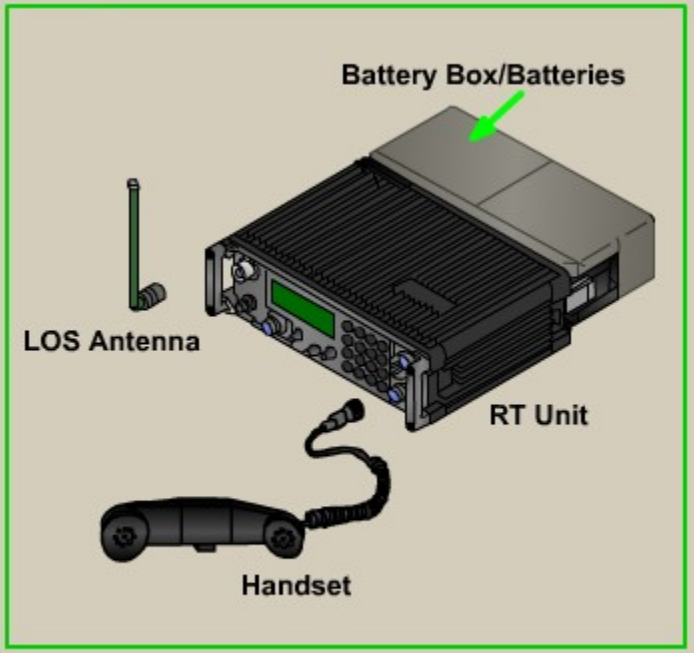
Unlike the multi-channel terminals that are housed in a carrier, these single-channel terminals can be used in manpack or vehicular mounted configurations. The manpack is small, lightweight, and carried on the soldier's back in much the same way as a backpack. The vehicular mounted radios have similar characteristics to the AN/PSC-3 and operate solely on the vehicle's power and



SAT/LOS Communications Components



Satellite Communications Components



LOS Communications Components

AN/PSC-3

24 VDC. Frequency Range 225.000 to 3999.995 MHZ
Power Output: AM 2 Watts FM 35 Watts
Modes of Operation: Secure Voice, Data and Retrans
Secure Voice: KY-57
Weight: 34 lbs

AN/PSC-5

24 VDC. Frequency Range 030.000 to 3999.995 MHz
Power Output: AM 0.35 to 5.0Watts FM 0.18 to 18 Watts
Built in Test (BIT checks all critical functions (GO/NO GO)
Embedded COMSEC
Fill Devices: KOI-18, KYK-13, KYX-15 or CYZ-10
Modes Switch Operation: Remote, OFF, Plain Text, Cipher Text, Fill 1, Fill2,
Update, and Zero
Weight: 11.8 lbs (Uses 2 batteries)

AN/PSC-7

24 VDC. Frequency Range 225.000 to 3999.995 MHZ
Power Output: AM 1 to 2.5 Watts FM 20 Watts(15 watts min)
Modes of Operation: AM, FM, X, D1.2, D2.4, Guard and Beacon
Secure Voice: KY-57 and ANDVT: KY-99
Weight: 10.5 lbs(without batteries

Which radio is vehicular mounted?

a. AN/PSC-7

b. AN/VSC-7

c. AN/PSC-5

d. AN/PSC-3

Which of these is a Single-Channel Satellite Communications Terminal?

a. AN/PSC-2

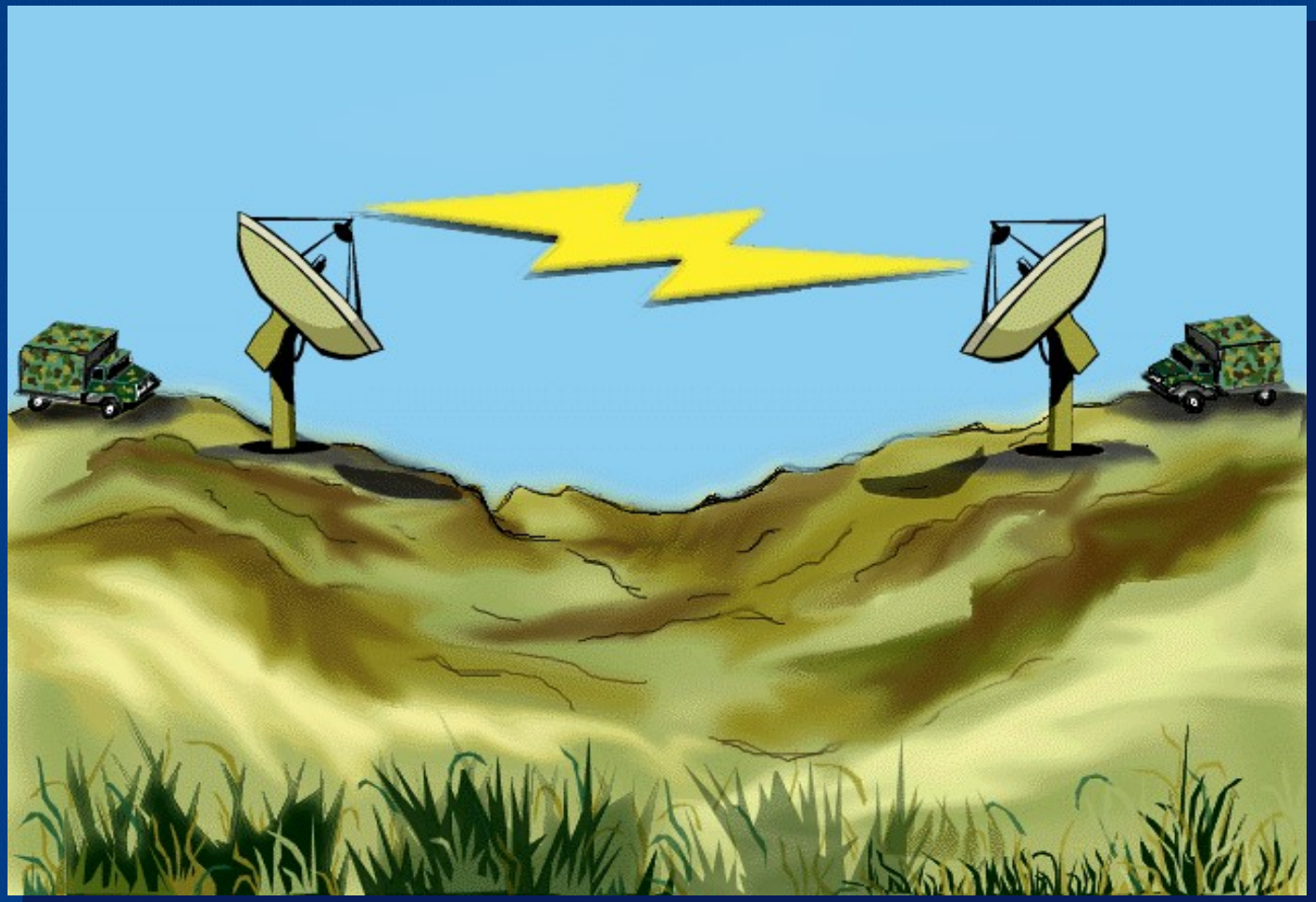
b. AN/PSC-3

c. AN/VSC-3

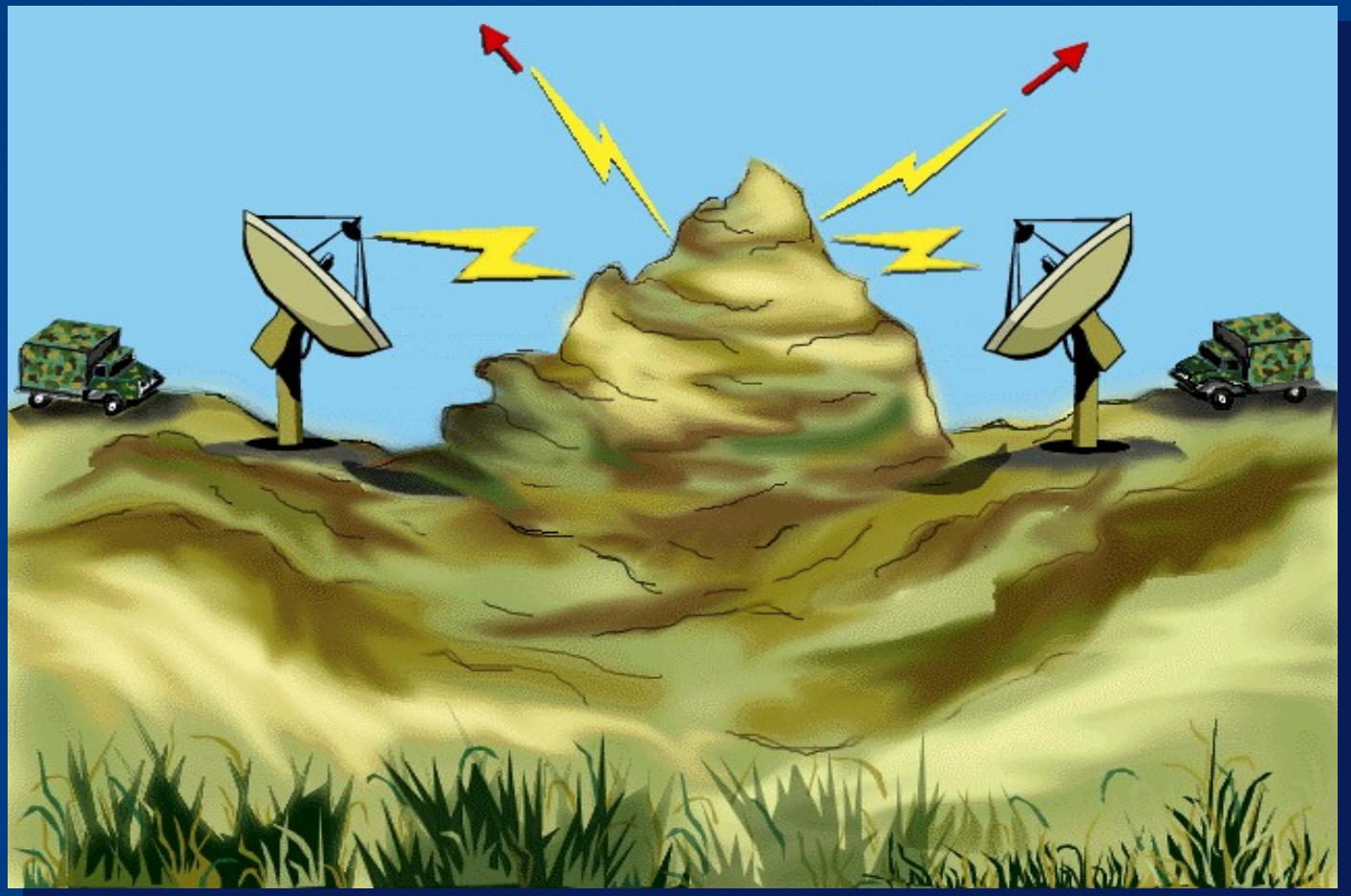
d. AN/VSC-5

It's essential for clear communication to occur within your unit and beyond. As a 31U soldier, you'll be responsible for maintaining communications that are essential to the success of any mission. You'll need to know the terminology used to described the conditions for clear signal transmission, as well as conditions that contribute to signal loss. These are Line-of-Sight or LOS and Non Line-of-Sight or Non-LOS.

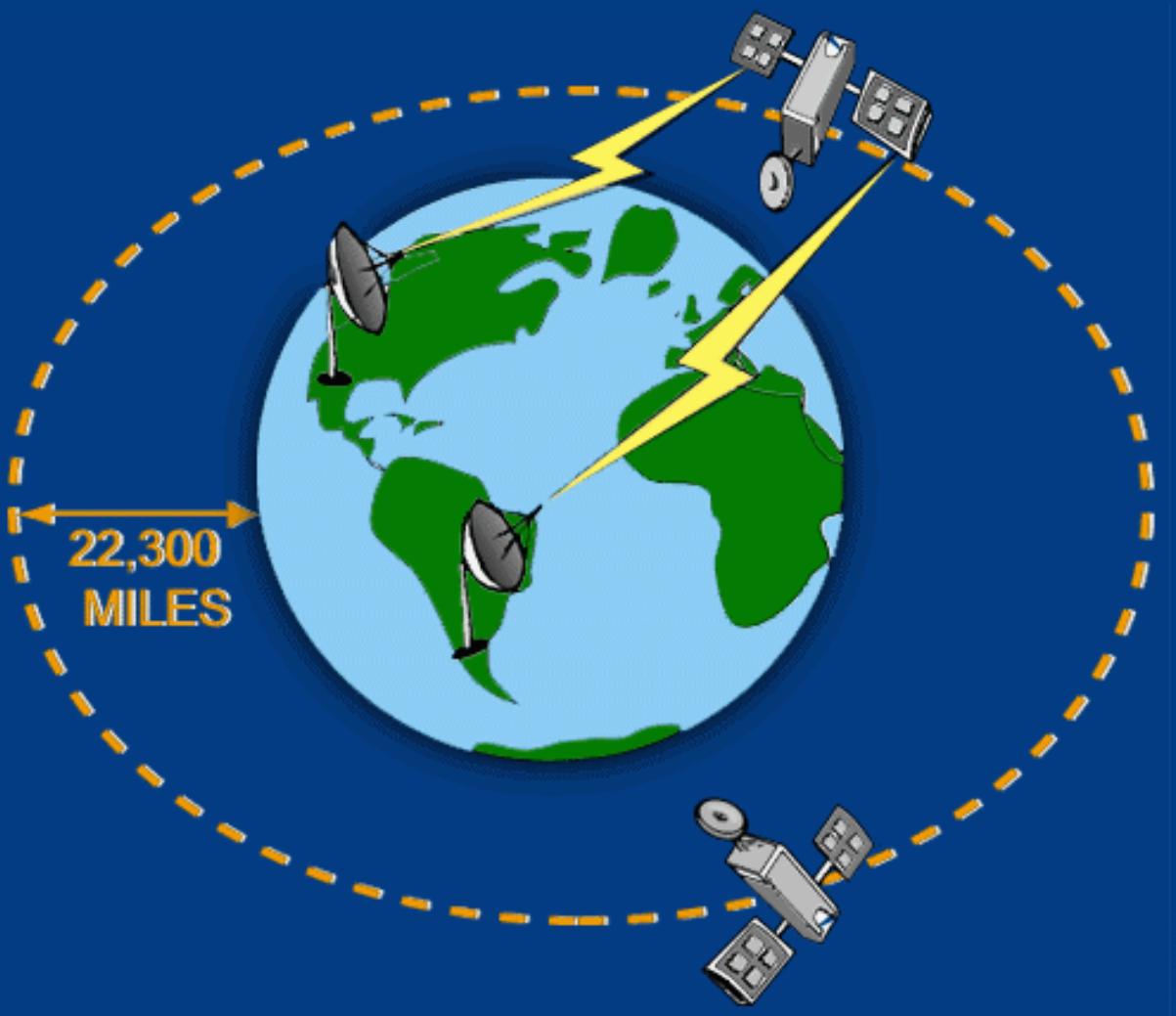
LOS - NO OBSTRUCTIONS



NON-LOS DUE TO MOUNTAINS OR OTHER OBSTRUCTION



LOS/NON-LOS DUE TO EARTH'S CURVATURE



Which is one cause for Non-LOS?

a. Physical obstruction

b. Satellite receives radio signals

c. Ground stations can “see” each other

d. Ground station is in an open field

Summary

Maintain Clear Communications